UCRL-JC-125130 Abs

ATTEMPTS TO FABRICATE SPECIAL ICF TARGETS USING THE DECOMPOSABLE MANDREL TECHNIQUE

E. M. Fearon, S. A. Letts, L. M. Allison, and R. C. Cook

University of California
Lawrence Livermore National Laboratory
P.O. Box 808, Livermore, CA 94551

We have developed a technique for building ICF targets by starting with a depolymerizing mandrel. The mandrel is a bead or thin-walled shell of poly(α-methyl styrene) (PAMS) whose size is chosen to determine the final size of the target. The basic process involves overcoating the PAMS with a layer of plasma polymer and then heating the composite until the PAMS depolymerizes to a gaseous monomer and diffuses through the more thermally stable plasma polymer, leaving a hollow shell.

This poster describes two variations on the basic decomposable mandrel technique to produce special targets for implosion physics experiments. We proposed to make targets with diameters up to 2 mm and with unique structural features: controlled texture or thin metal layers on the inner surface. We start with a thick-walled PAMS shell mandrel. We first apply controlled texturing or a thin layer of titanium to the surface of the mandrel and then overcoat with plasma polymer. When the composite shell is baked, the PAMS depolymerizes and leaves a hollow shell with the special treatment on the inside surface.

We have produced initial shells of both of these techniques. We present the techniques, characterization, and results of the development experiments in this poster. The initial efforts were not altogether as successful as we had hoped. In the case of the special texturing, the pattern is reproduced on both the inner and outer surface of the shell. We would have to work further if the outer surface is to be smooth. In the case of the inner layer of titanium, the sphericity of the baked shell is adversely affected by the baking process. We will discuss some of our investigations into causes.

*Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract No. W-7405-ENG-48.